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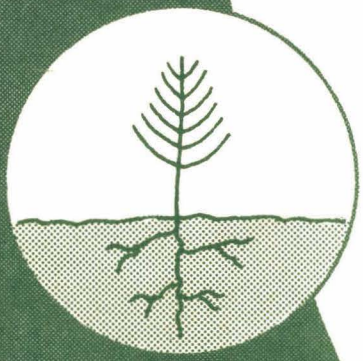
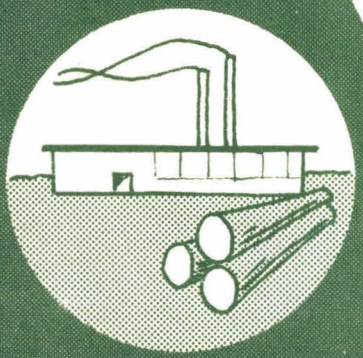
TARGETS FOR FOREST RESEARCH





BEREA FOREST RESEARCH CENTER

CENTRAL STATES FOREST EXPERIMENT STATION
U. S. DEPT. OF AGRICULTURE - FOREST SERVICE

TARGETS FOR FOREST RESEARCH

A First Year Look - 1955

The Berea Forest Research Center is now well into its second year. The first year was a time of beginnings, a time for establishing goals and setting up targets. We've got our sights pretty well lined up now; we have a much better idea of what we're shooting at than when we first started work.

Every research project begins with a question. And so our research program at present is a whole series of questions, each one representing a separate target, but all aiming toward a single goal -- better forests and forestry for Kentucky. In this report we'd like to review some of these questions and examine our targets, bring you up to date on what we've started to do, and outline our general plans for the future.

But first, a little history.

Forests of eastern Kentucky once produced some of the finest hardwoods in the world. Today these forests are growing timber at a fraction of their potential rate and producing little high-grade timber. In order to help make these forests produce more and better timber, the 83rd Congress provided for the establishment of a forest research center in Kentucky. On December 6, 1954 the Central States Forest Experiment Station opened the headquarters office of the

Berea Forest Research Center in Berea. Shortly after that the Research Center and Berea College formally agreed to cooperatively consider, develop, and share in the responsibility of conducting forest research studies in the north Cumberland Plateau Area, which includes the hilly and mountainous part of eastern Kentucky. Also, to further coordinate the research work with that of others, a formal agreement was entered into with the Kentucky Agricultural Experiment Station.

Initially two research foresters made up the Center's staff. Things soon began to expand so that today we have three research foresters, one forest entomologist, one forestry aide, and a clerk-stenographer in the organization.

MAJOR TARGETS FOR FORESTRY IN KENTUCKY

One of the first jobs was to make an appraisal of the forest situation and to study the physical, economic, and social characteristics of the area. To do this we reviewed past work, traveled over the area, and contacted people who were interested in the forest resource. There is still much more to be learned. However, we do know that the forests, which occupy more than three-fourths of the land area, are not contributing adequately to the economy of this low-income region. The forests have been overcut, highgraded, and burned with little thought for the future. In spite of this abuse and neglect, the forests still have the capacity to produce good timber crops. However, past treatment has left some unique problems that need to be solved in order to restore the forest land to full productivity.

WE MUST FIND WAYS TO MANAGE KENTUCKY'S FORESTS SO THEY WILL PRODUCE MORE AND BETTER TIMBER

The forests are only producing from one-quarter to one-half as much timber as they should, and more than 80 percent of the sawtimber is in low-quality logs. We need to determine methods for rehabilitating low-grade forest stands to make them fully productive. Some questions that need to be answered are:

1. Which of the existing trees should be kept to produce our future crop?

2. How can the number of sound trees of good species be increased?
3. What needs to be done to provide enough of the right kind of reproduction to improve and perpetuate the forest?
4. How can the cull and low-value trees be eliminated to make room for more desirable trees?
5. What treatments are necessary to obtain a forest with the proper combination of species and size classes?
6. What treatments are necessary to convert dry ridgetop sites from low-grade hardwood stands to faster growing pine?

We need to determine the forest type and stand structure required for producing maximum volumes of wood under various growing conditions in different parts of the region. Some questions that need to be answered are:

1. What kinds of trees can best be grown on each type of site?
2. How many trees and of what size and age should they be to produce maximum volumes of quality sawlog trees on the various sites?
3. At what age and size do the trees reach maturity on the various sites?
4. How can these results on optimum stand structure be applied to unmanaged stands in the area?

We need to determine the best practices for managing existing well-stocked forest stands. Some of the questions that need to be answered are:

1. What method of harvest cutting will provide adequate natural regeneration of desirable species?
2. What treatments, such as thinning, weeding, pruning, etc., are necessary to obtain maximum volume of quality sawlog trees?

We need to determine and demonstrate methods of managing small woodlands that are comparable to most farm woodlands.

We need to develop a local planting guide for the State. Many of the planting problems have been solved and the job will be mainly one of applying present knowledge to the conditions within the State.

PROTECTING THE FORESTS FROM FIRE, INSECTS, AND DISEASE IS THE FIRST STEP TOWARD BETTER MANAGEMENT

The one thing most essential to good forest management is protecting the forest from fire, insects, and disease. Uncontrolled fires destroy the young trees, retard tree growth, pave the way for insect and disease attacks, and leave our watersheds unprotected.

Each year more than 250,000 acres of Kentucky's woodlands are burned. In 1952, an extremely dry year, 1 1/2 million acres were burned in a few weeks. Almost all the fires are man-caused. In 1954, there were 1,002 forest fires in the 42 counties having

organized protection from fire. More than 80 percent of these fires were caused by debris burning, smokers, and incendiarism. Reducing fires alone will go a long way toward making forests more productive and protecting watersheds. However, only a little more than half of Kentucky's 11 million acres of forest land has any kind of organized fire protection. Fire problems are many and complex. Some questions that need to be answered are:

1. How can the number of man-caused fires be reduced? Any solution to this problem is closely tied in with the people. No fire-control program is going to be a success without an effective prevention program.
2. How can the forest area burned be kept to an acceptable minimum? Solutions to this problem are directly related to burning conditions, fire behavior, fire-fighting techniques, and equipment.
3. What kind of fire protection organization is needed to adequately meet the fire situation in the critically dry years as well as in average years?
4. What are the direct and indirect effects of fires on the hardwood forests of Kentucky? This includes the effects resulting from the little creeping fires as well as from the large spectacular fires.

Insects and disease are responsible for many of the cull and low-grade trees in the forest. The forest survey of Kentucky showed

that 1 out of every 5 sawtimber-size trees was cull. A 1954 survey of sawmills in eastern Kentucky showed that more than 90 percent of the oak sawlogs were damaged by insects. The insects and decay organisms that are constantly active in the forests are often overlooked. Yet they destroy large volumes of wood each year. Then there are other more spectacular insects and diseases, such as the southern pine beetle and oak wilt, which are a constant threat to our yellow pine and oak forests. There is need for an organization in Kentucky to detect and control outbreaks of forest insects and diseases which threaten the forests. Some questions that need to be answered are:

1. What insect species and decay organisms are involved?
2. How do the insects and fungi enter the trees and to what extent are they responsible for losses in volume?
3. How do growth, site, stand density, and composition affect insect and disease defects in sawtimber?

BETTER UTILIZATION AND MARKETING ARE IMPORTANT KEYS TO A HEALTHY FOREST ECONOMY

Ways will have to be found to economically remove large volumes of low-quality materials before the forests can yield a maximum return. Good forest management is impossible unless something can be done to utilize the trees that should be removed from the stands to keep the forests productive. The 1949 forest survey showed that 85 percent of the hardwood sawtimber volume in Kentucky

was in low-quality logs. This is not cull material but good sound wood that could be used by industry. The problems are further complicated by the fact that the bulk of Kentucky's forest products are exported for secondary processing, and it is only the high-quality products that can be economically exported. This leaves the low-quality products without an adequate market. Furthermore, the income that could be derived from secondary processing is lost.

Much of the timber in the forest is not being used for the highest value products it can yield because there are no ready markets. Some questions that need to be answered are:

1. What are the possibilities of establishing new industries that can use low-quality wood?
2. What are the possibilities of developing concentration yards where the cut timber is marketed for the highest value product it will yield?
3. What are the possibilities of developing new uses for low-quality products?

Timber has been harvested and manufactured into products in much the same way for the past 50 years. It is not economically possible to remove much of the low-grade material in the forests by these antiquated techniques. Some questions that need to be answered are:

1. What are the possibilities of lowering production costs through the use of improved machinery and equipment?
2. What are the possibilities of lowering production costs through the use of new methods and techniques?

GOOD WATERSHED MANAGEMENT IS VITAL TO ANY LAND-USE PROGRAM

Forests are vital to soil and water conservation. This is especially true in the hilly and mountainous region of eastern Kentucky. In this region soils erode rapidly when they are not protected with a good vegetative cover. Flash-runoff of rain with downstream floods followed by long periods of diminished streamflow and dry stream beds is commonplace. Several towns in the region have had to build new water reservoirs because the old ones have been completely filled with sediment. Other towns have had to build new reservoirs because the water supply was inadequate. Erosion, dry wells and springs, local floods, and rapid sedimentation of water storage reservoirs are the danger signals. The land is not being managed so as to adequately protect the watersheds. Some of the practices that are contributing to watershed damage are:

1. Steep slopes are cultivated and pastured.
2. Uncontrolled fires are damaging the forest cover.
3. Most timber harvesting operations are carried on with no consideration given to watershed damage.
4. Most mining operations are carried on with no consideration given to watershed damage.

The major problem is to integrate watershed management with timber production, agriculture, mining, recreation and other uses. Some basic principles have been developed for managing land for timber production and watershed protection. However, there is a need for further investigation to develop and experimentally test principles of watershed management that apply to eastern Kentucky.

HIGHLIGHTS OF WORK AT THE CENTER

1. The Berea Forest Research Center was established with headquarters on the campus of Berea College.
2. Cooperative agreements completed with Berea College and the Kentucky Agricultural Experiment Station. These provide for the sharing of responsibilities in conducting forest research studies in the North Cumberland Plateau Area.
3. Began to prepare a problem analysis that points out the major forest problems in the area, analyzes them from the standpoint of possible research attack and priority, and provides a clear view of their interrelationships.
4. Established the Bald Rock Experimental Forest on the Cumberland National Forest. This is an area of about 3,000 acres which is representative of the Cumberland Plateau forests.
5. Began a woodland management study on the Berea College Forest. The first harvest cutting treatment is in progress on two 20-acre research units representing two different sites and forest types. The object of this study is to develop and demonstrate an easily applied system of woodland management to an area which is comparable to most farm woodlands.

6. Began a regeneration study on the Kentucky Agricultural Experiment Station forest at Noble, Kentucky. A harvest cutting has been made on two 25-acre tracts, one with an east exposure and the other with a west exposure. Several treatments will be tested to find economical ways of getting desirable new trees on an area where old ones have been removed.

7. Skid-trail erosion study was begun on the Kentucky Agricultural Experiment Station forest at Noble, Kentucky. Profile studies will be made to determine the erosion on skid trails with grades of 25, 35, and 45 percent.

8. Examined and remeasured harvest cutting plots, established in 1928, on the Berea College Forest. Data are being analyzed and a report being prepared on the findings.

9. Began examination of some conversion study plots on the Cumberland National Forest. These were studies to determine methods of converting ridgetops and upper dry slopes from low-quality hardwoods to pine.

10. Prepared a general article on the research center and some of the forest problems in the area. Published in Mountain Life and Work, 2nd issue, 1955.

11. Began a study on insect damage to hardwood sawtimber to determine what insects are involved, and the relationship of growth, site, stand density, and composition to insect

defects in sawtimber. This study has already yielded some interesting results; "Insect Damage in Hardwood Sawlogs," by C. John Hay and John F. Wootten, Technical Paper No. 148, Central States Forest Experiment Station, November 1955.

GENERAL PLANS FOR THE FUTURE

1. Development of Bald Rock Experimental Forest.
2. Begin stocking studies in oak-hickory and mixed hardwood forest types to determine stand structure required for producing maximum volumes on various sites.
3. Begin studies to determine how to bring an unmanaged mixed hardwood forest into full production.
4. Continue studies on:
    a. Small woodland management
    b. Regeneration
    c. Stand conversion
    d. Insect damage
5. Prepare problem analysis for the center area.
6. Maintain contacts and actively participate in forestry activities of the State.
7. Publish information on research results.
8. If possible, expand the research program to include studies on fire, diseases, utilization, marketing, and watershed management.

This report is from the
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